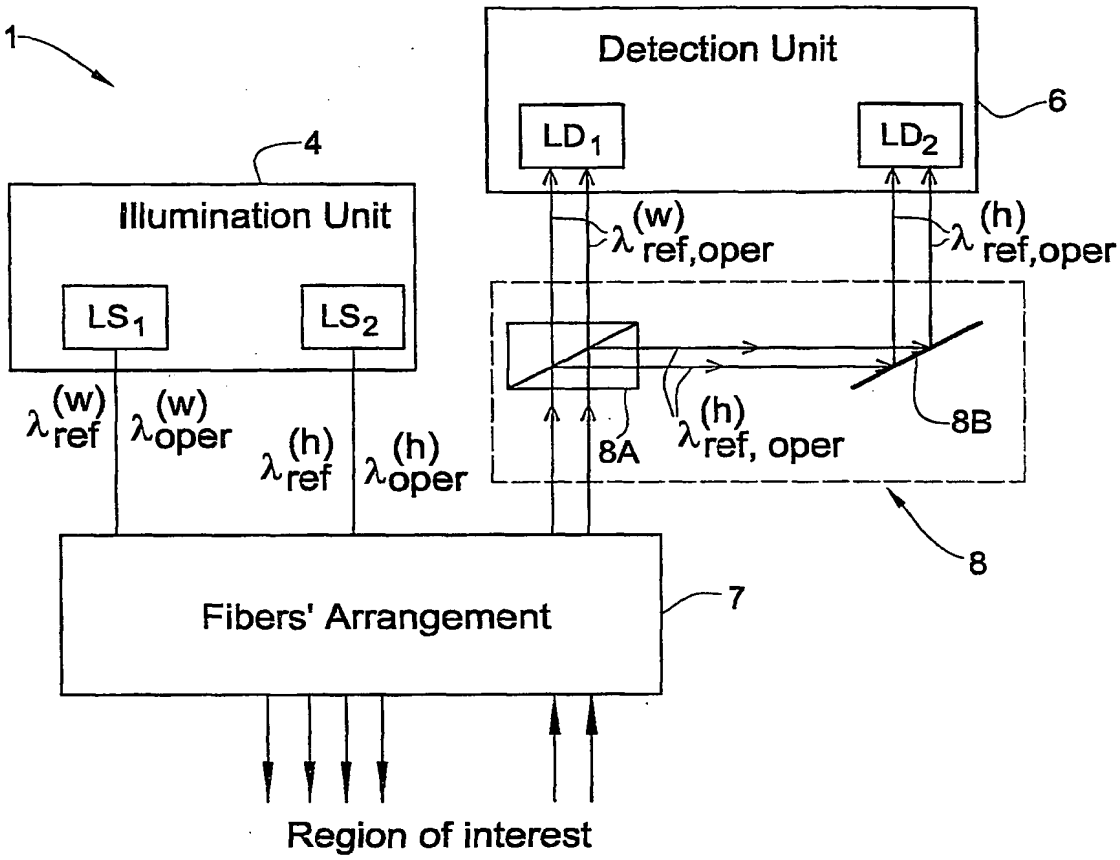
1
Detection Unit
6
LD1
LD2
4
Illumination Unit
LS1
LS2
λ(w) ref,oper
λ(h) ref,oper
λ(w) ref
λ(w) oper
λ(h) ref
λ(h) oper
8A
λ(h) ref, oper
8B
8
Fibers' Arrangement
7
Region of interest

FIG. 1A

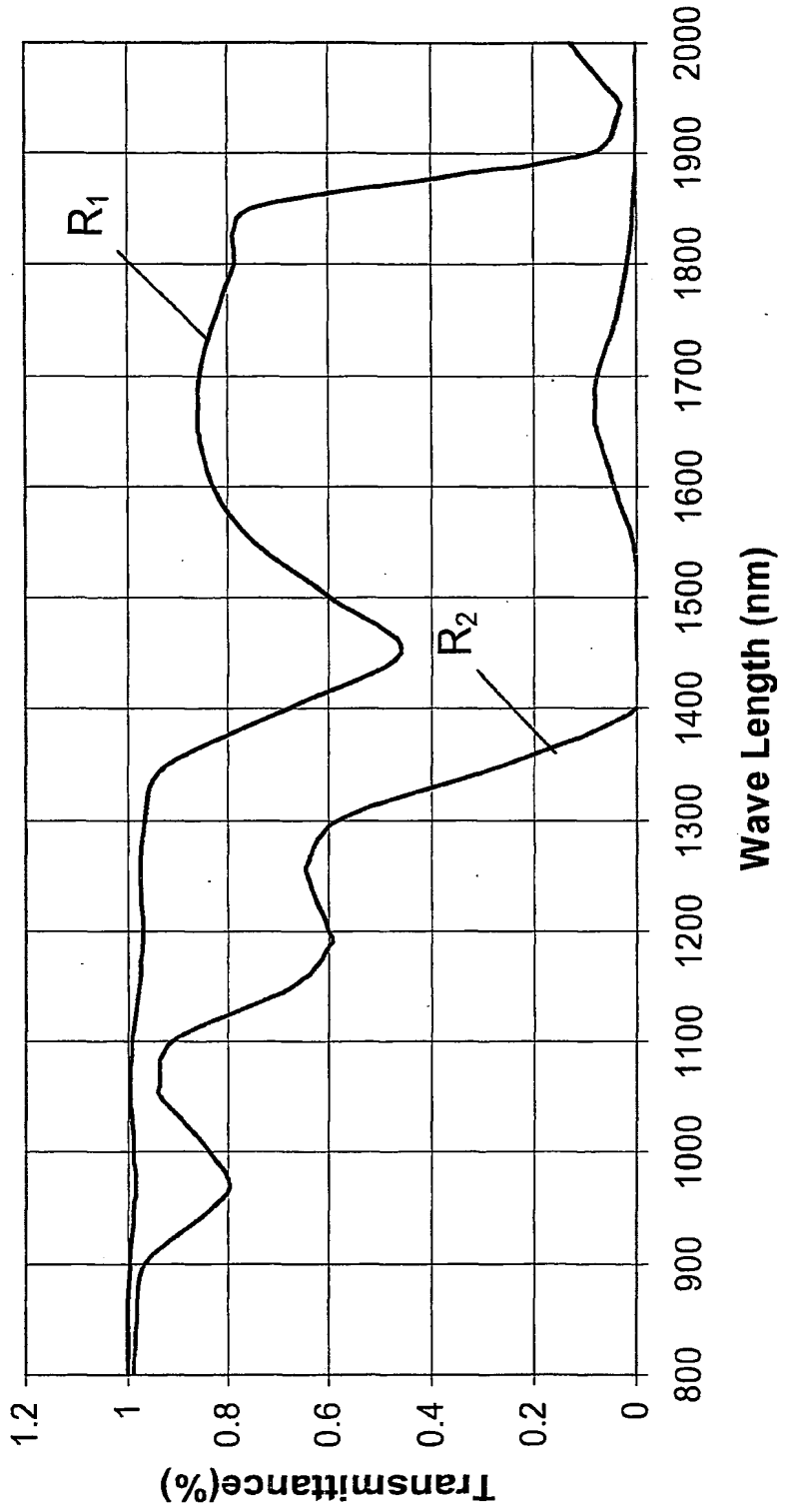
R1
R2
Transmittance(%)
1.2
1
0.8
0.6
0.4
0.2
0
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Wave Length (nm)

FIG.1B

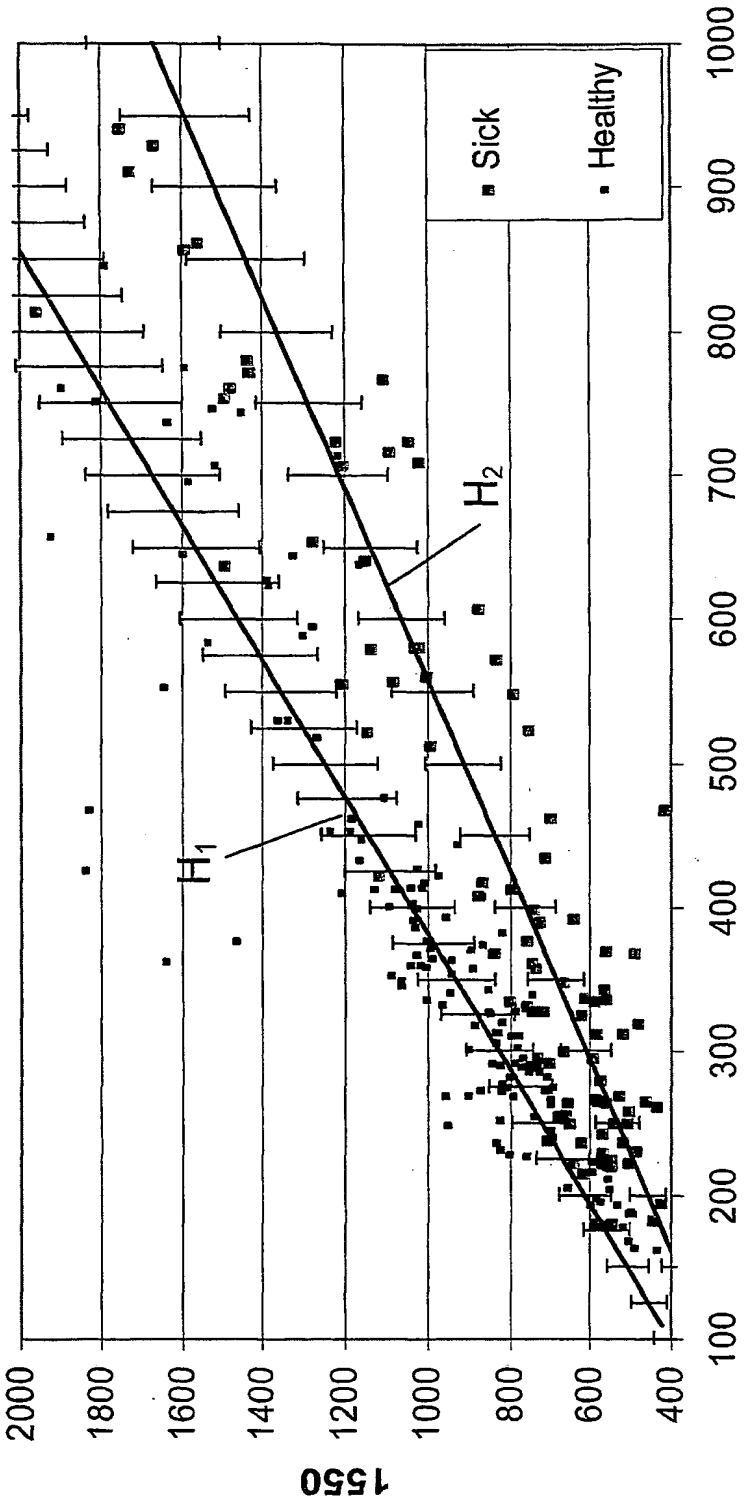
1550
2000
1800
1600
1400
1200
1000
800
600
400
1440
100
200
300
400
500
600
700
800
900
1000
Sick
Healthy
H1
H2

FIG.1C

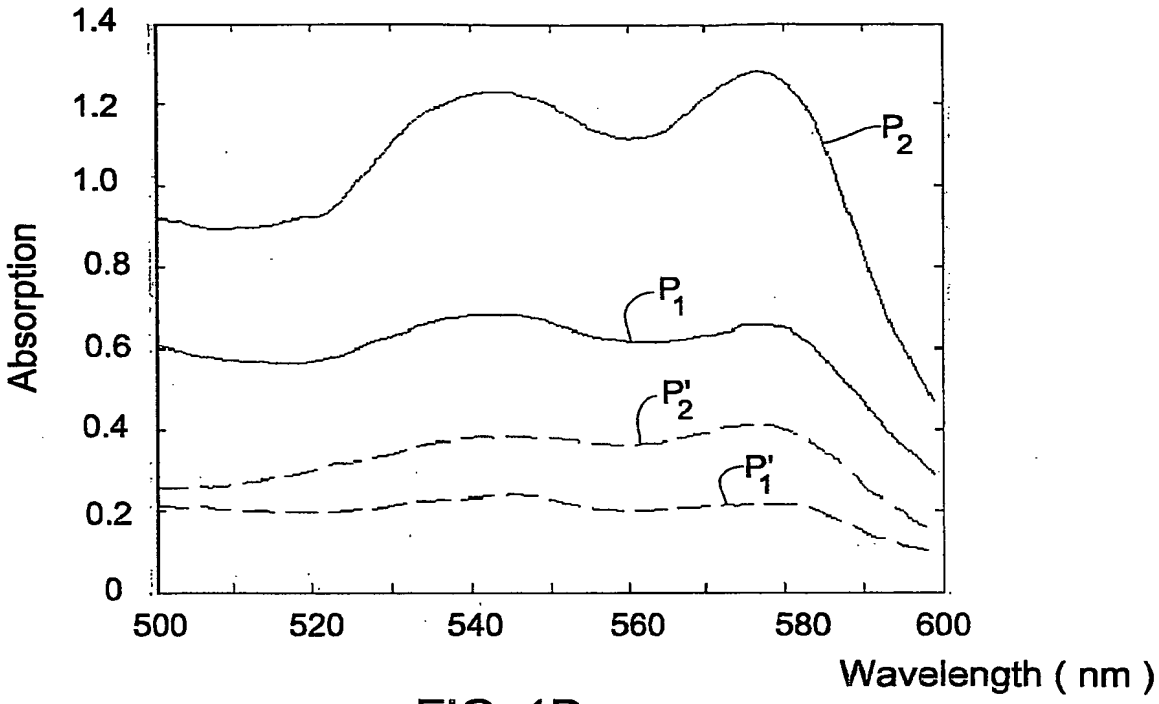

FIG. 1D

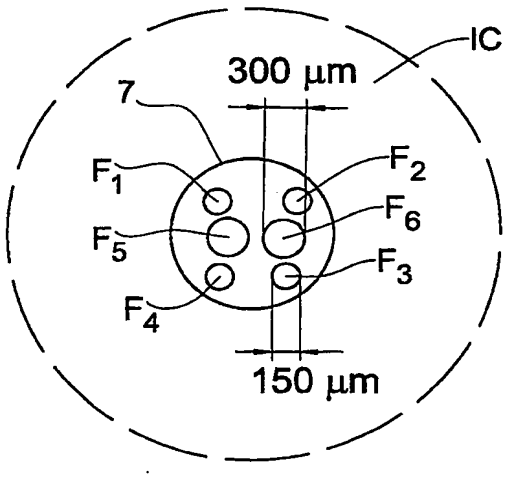

FIG. 1E

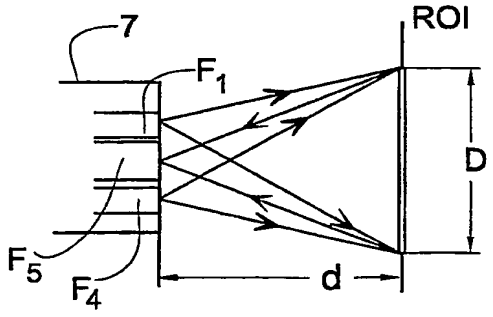

FIG. 1F

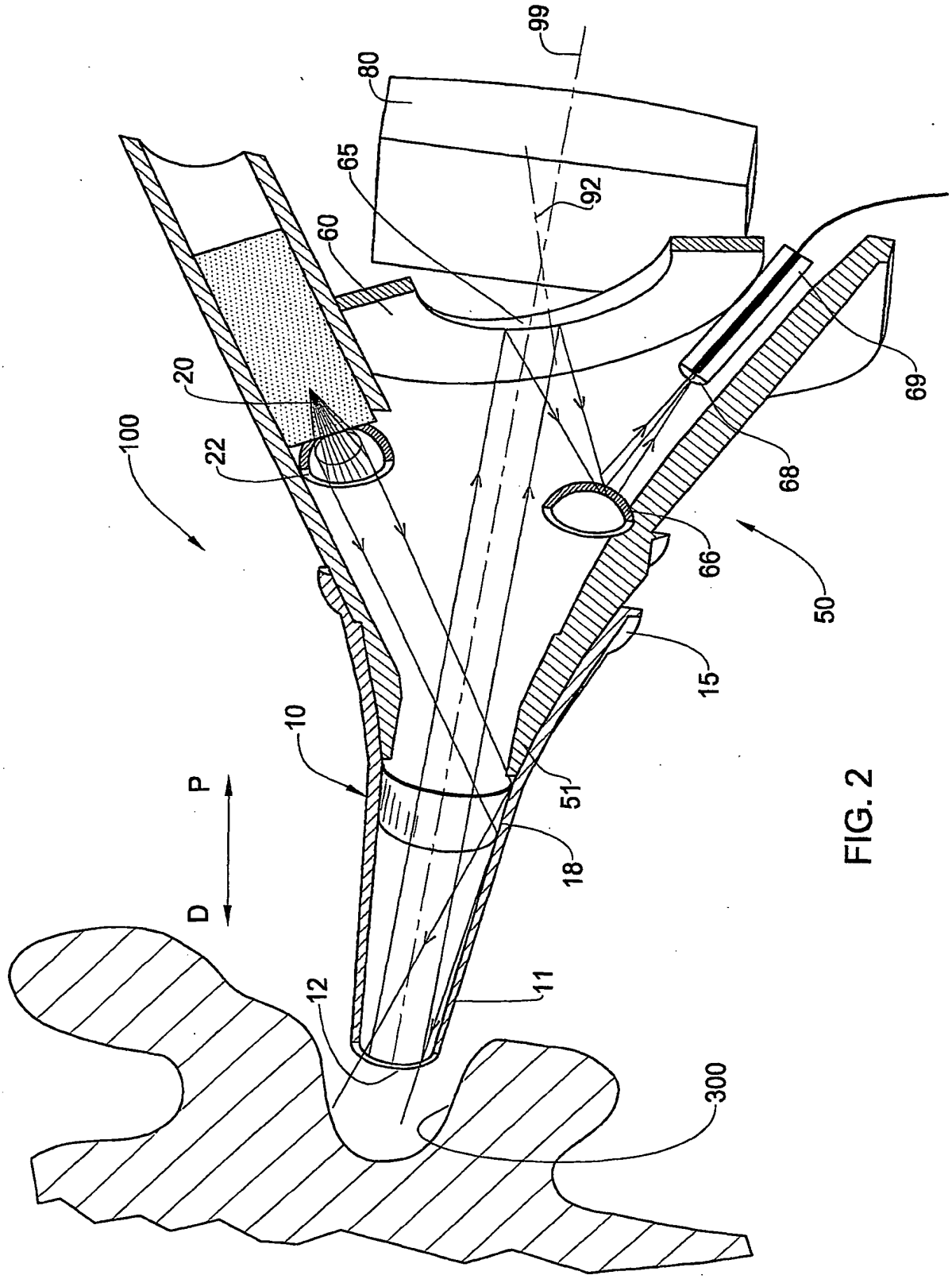

FIG. 2

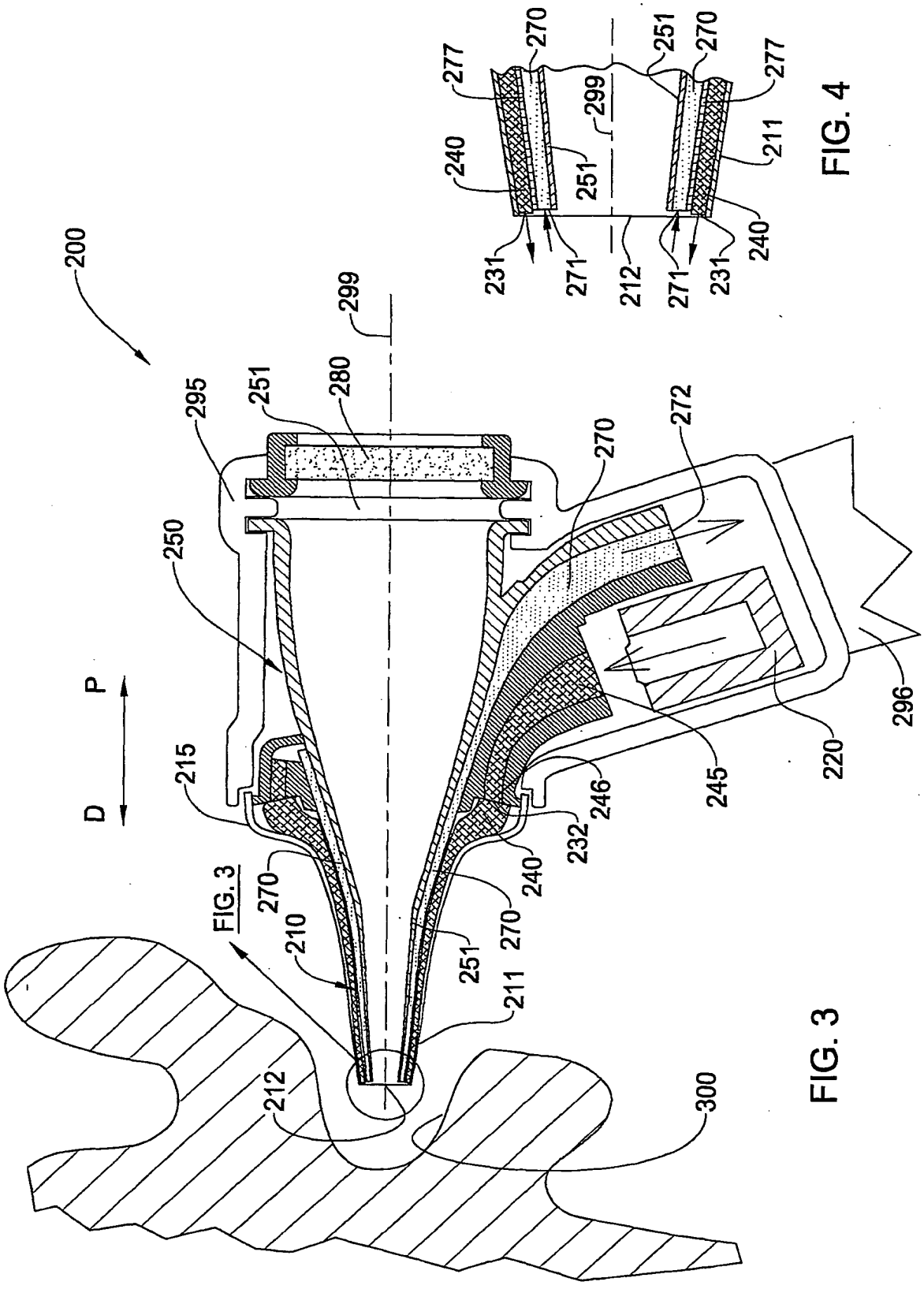
200
299
295
251
280
250
270
272
P
D
215
270
210
211
212
240
232
246
245
220
296
300
277
270
251
270
277
299
240
251
211
231
271
212
271
231
240

FIG. 3

FIG. 4

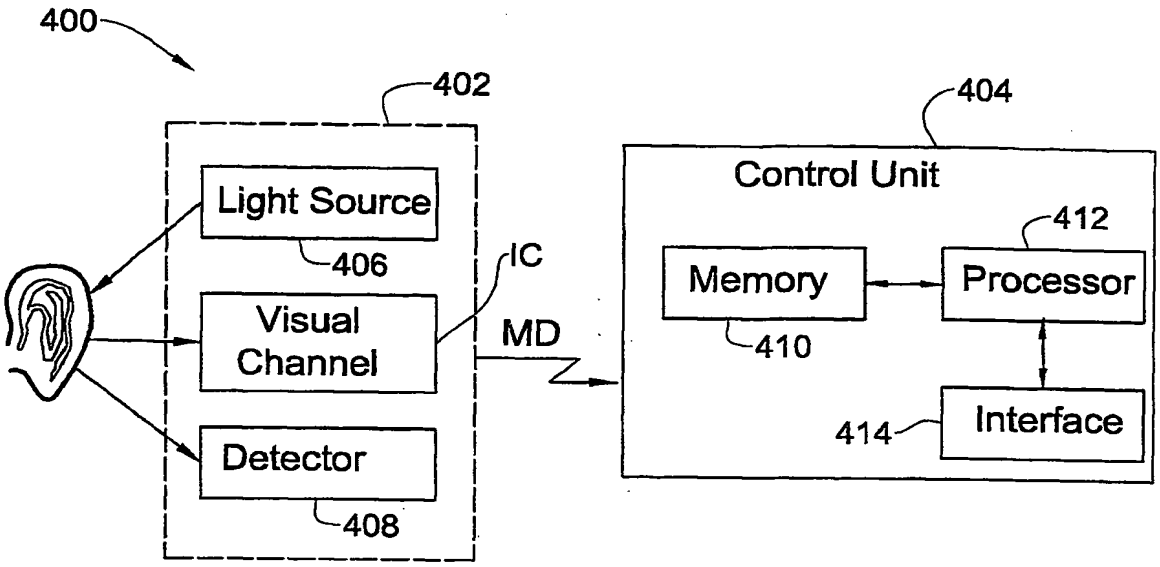
400
402
404
Light Source
406
IC
Visual Channel
MD
Detector
408
Control Unit
412
Memory
Processor
410
414
Interface

FIG. 5

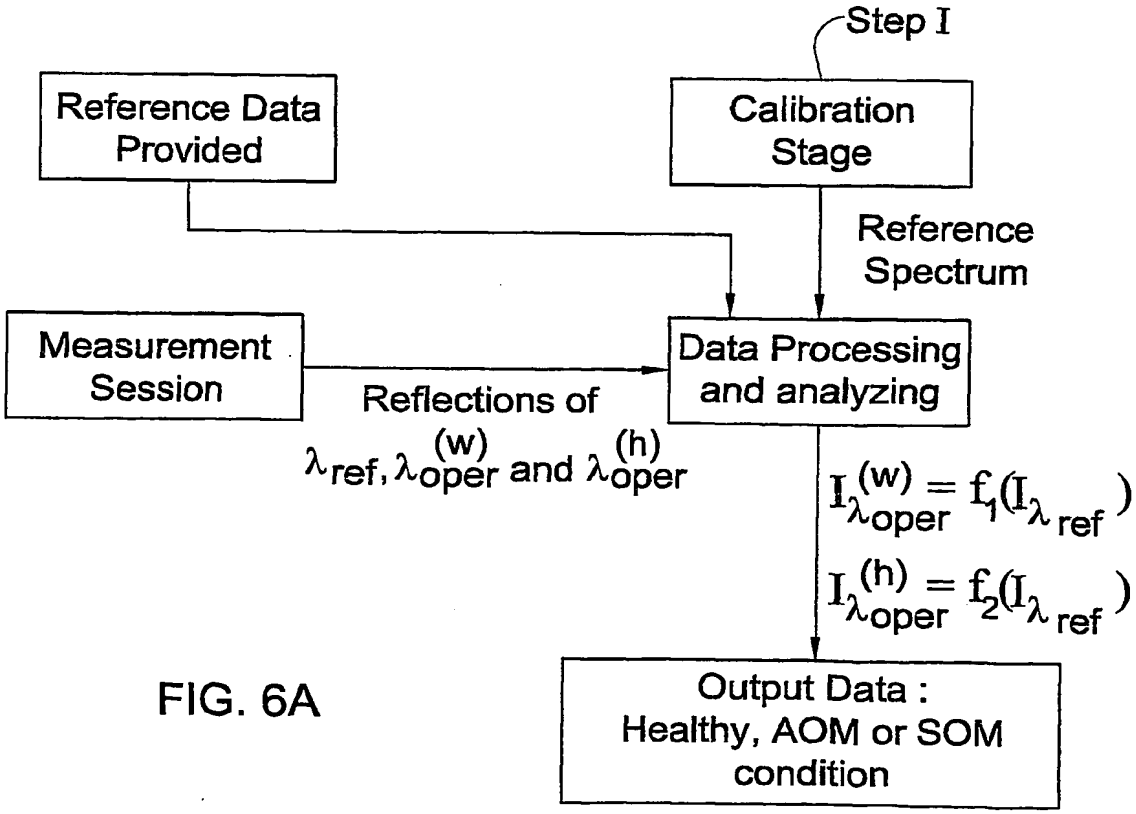
Step I
Reference Data Provided
Calibration Stage
Reference Spectrum
Measurement Session
Data Processing and analyzing
Reflections of
$\lambda_{ref}, \lambda_{oper}^{(w)}$ and $\lambda_{oper}^{(h)}$
$I_{\lambda_{oper}}^{(w)} = f_1(I_{\lambda_{ref}})$
$I_{\lambda_{oper}}^{(h)} = f_2(I_{\lambda_{ref}})$
Output Data : Healthy, AOM or SOM condition

FIG. 6A

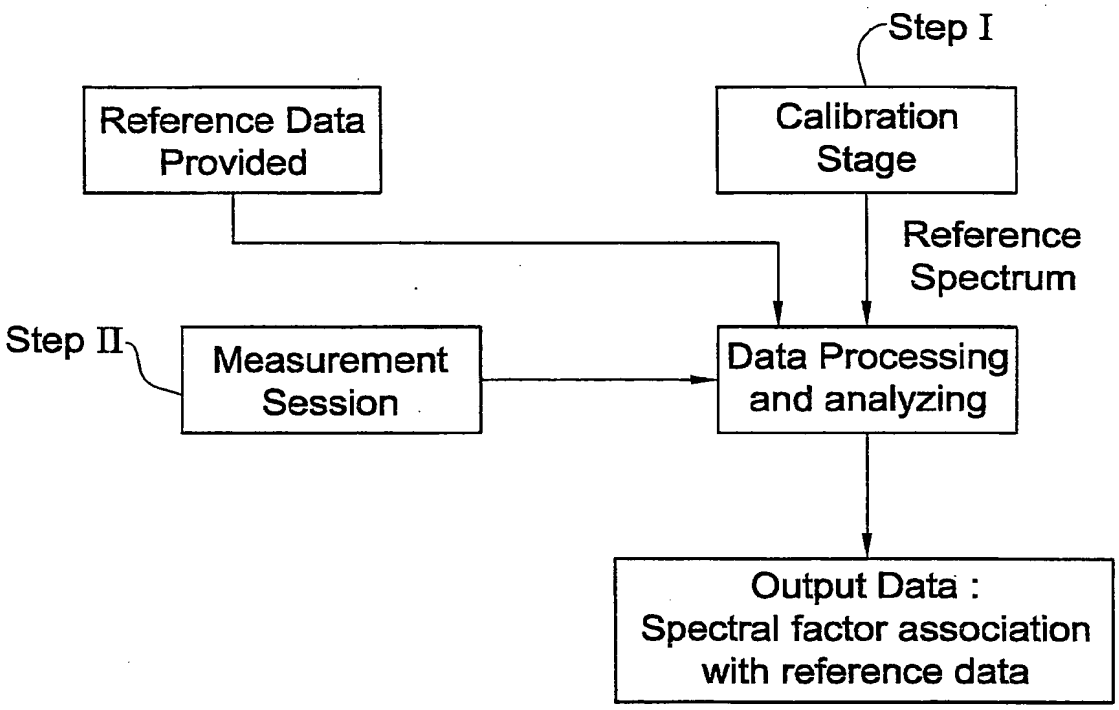
Step I
Reference Data Provided
Calibration Stage
Reference Spectrum
Step II
Measurement Session
Data Processing and analyzing
Output Data : Spectral factor association with reference data

FIG. 6B

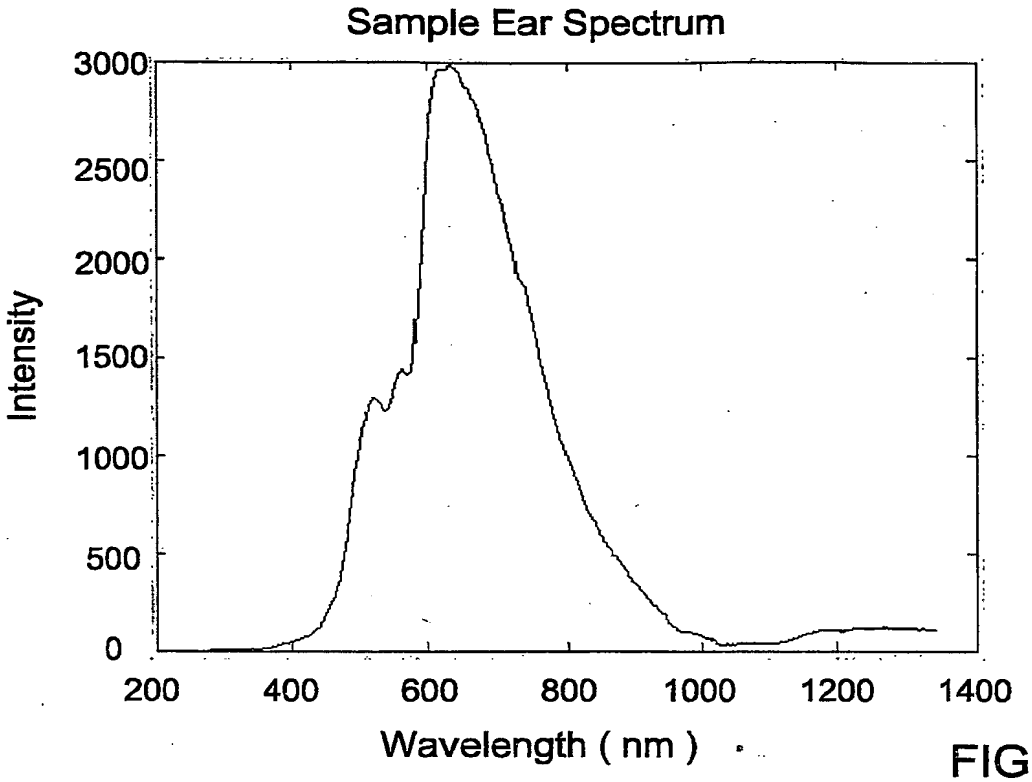
Sample Ear Spectrum
Intensity
3000
2500
2000
1500
1000
500
0
200
400
600
800
1000
1200
1400
Wavelength (nm)

FIG. 7A

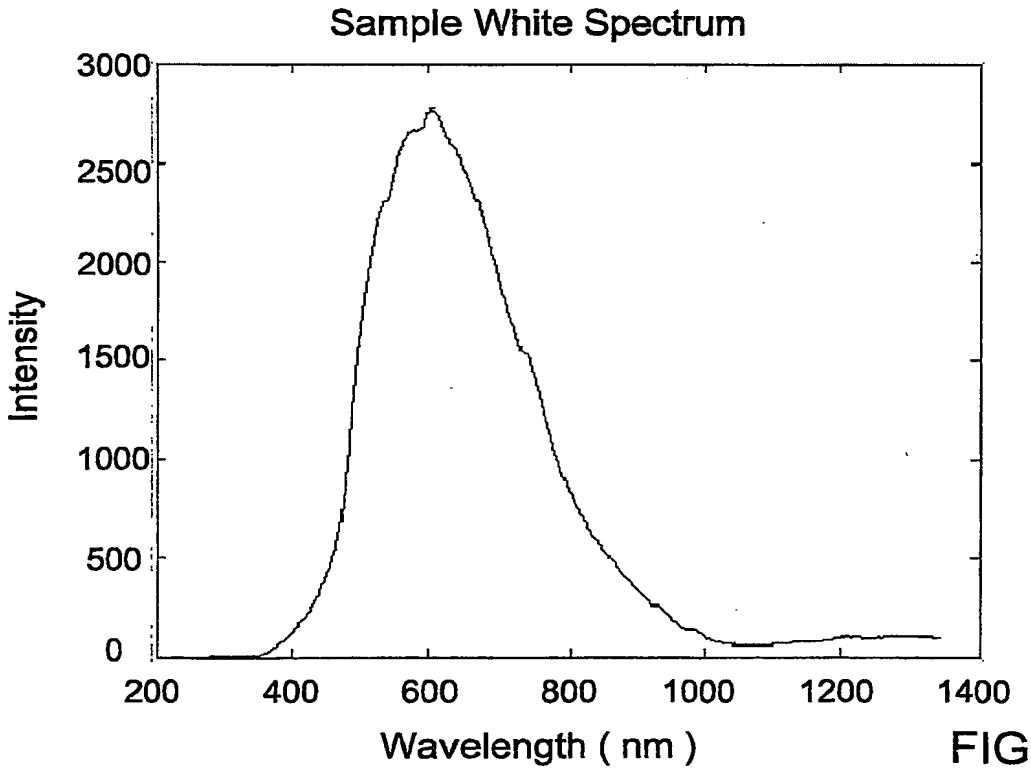
Sample White Spectrum
Intensity
3000
2500
2000
1500
1000
500
0
200
400
600
800
1000
1200
1400
Wavelength (nm)

FIG. 7B

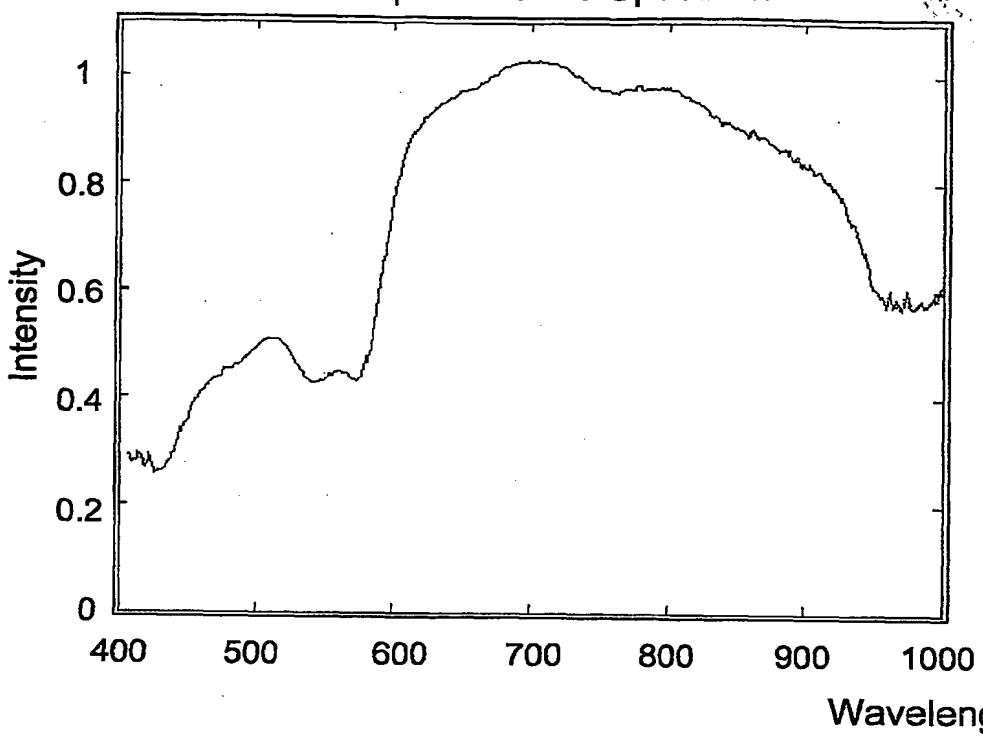
Sample Relative Spectrum
Intensity
1
0.8
0.6
0.4
0.2
0
400
500
600
700
800
900
1000
Wavelength (nm)

FIG. 8A

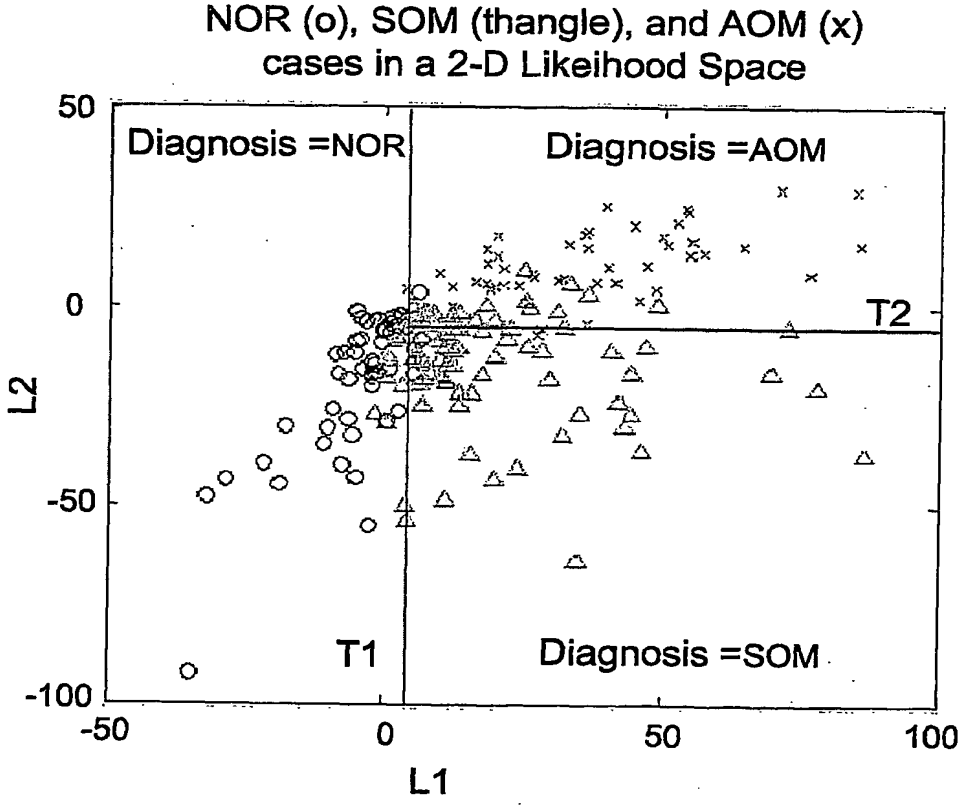
NOR (o), SOM (thangle), and AOM (x)
cases in a 2-D Likeihood Space
Diagnosis =NOR
Diagnosis =AOM
T2
T1
Diagnosis =SOM
L2
L1
50
0
-50
-100
-50
0
50
100

FIG. 8B